the layer could have a high Tb and a high J at 200°C even if it is thin, so far as the close-packed plane therein is oriented in the same manner as above. The close-packed plane as referred to herein is meant to indicate the (111) peak for the fcc phase, the (002) peak for the hcp phase, and the (110) peak for the bcc phase. In the case of PtMn or the like containing a ordered, face-centered cubic system phase, the remaining fcc phase shall be oriented in the (111) plane, or the (111) plane of the ordered, face-centered cubic system phase shall be oriented. The fcc phase and the hcp phase may have lamination defects.

As in Fig. 20, the half-value width of the diffraction peak from the close-packed plane of the layer in its rocking curve could be represented by the fluctuation of the close-packed plane spots in the direction perpendicular to the film surface in the transmission electron microscopic images of the cross section of the head, and the half-value width in the rocking curve in X-ray diffractiometry nearly corresponds to the fluctuation angle of the close-packed plane spots in the transmission electron microscopic images.

To realize such good close-packed plane orientation, the spin valve films may be formed in an atmosphere with impurities such as oxygen gas and others therein being minimized as much as possible. For example, for forming the films, employable are a deposition method in which is used an

apparatus capable of pre-degassing the system to a level of around 10^{-9} Torr; a deposition method in which is used a sputtering target of which the oxygen content is lowered to at most 500 ppm; a substrate bias sputtering method in which a controlled degree of energy is applied to the sputtered atoms while the atoms are deposited on the substrate; and a deposition method in which a underlayer of a simple noble metal of, for example, Au, Cu, Ag, Ru, Rh, Ir, Pt, Pd or the like, or a underlayer of an alloy of any of those noble metals, of an Ni-based alloy layer of NiFe, NiCu, NiFeCr, NiFeTa or the like is provided between the alumina ~~cap~~ gap layer and the spin valve film.

The above is to explain the outline of the technical field common to the second to sixth embodiments of the invention as directed to the "improvement in the thermal stability and the reproduction output power".

The second to sixth embodiments of the invention are described in detail hereunder.

Second Embodiment:

Fig. 17 shows one example of the magnetoresistance effect head of this Embodiment. As in Fig. 17, a lower shield 11 and a lower gap film 12 are formed below an AlTiC ($Al_2O_3 \cdot TiC$) substrate, and a spin valve device 13 is formed thereon. The lower shield 11 may be of NiFe, a Co-based amorphous magnetic alloy, an FeAlSi alloy or the like having a thickness of from

0.5 to 3 μm, and it is desirable that NiFe or the FeAlSi alloy, if used, is polished to remove surface roughness. The lower gap layer 12 may be of alumina or aluminium nitride having a thickness of from 5 to 100 nanometers.

The spin valve device comprises a spin valve film 14, a pair of longitudinal bias films 15 and a pair of electrodes 16. The spin valve film comprises a nonmagnetic underlayer 141 of Ta, Nb, Zr, Hf or the like having a thickness of from 1 to 10 nanometers, an optional second underlayer 142 having a thickness of from 0.5 to 5 nanometers, an antiferromagnetic layer 143, a pinned magnetic layer 144, an interlayer 145 having a thickness of from 0.5 to 4 nanometers, a free layer 146, and an optional protective film 147 having a thickness of from 0.5 to 10 nanometers.

Above the spin valve device, formed are a gap layer 17 and an upper shield 18. Though not shown, a recording part is formed over them. The gap layer may be of alumina or aluminium nitride having a thickness of from 5 to 100 nanometers; and the upper shield 18 may be of NiFe, a Co-based amorphous magnetic alloy, an FeAlSi alloy or the like having a thickness of from 0.5 to 3 μm.

Where the antiferromagnetic layer 143 is of a γ-Mn-based, Mn-rich alloy of IrMn, RhMn, RhRuMn or the like, or of a ordered, face-centered cubic system alloy of PtMn, NiMn or the like, it is desirable that the underlayer 142 is of a metal